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Introduction and Key Concepts: State Energy-Related Carbon Dioxide Emissions Tables

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Introduction and Overview

Energy-related carbon dioxide (CO2) emissions vary significantly across states, on both an absolute basis and on a per capita basis. Total state CO2 emissions include CO2 emissions from direct fuel use across all sectors, including residential, commercial, industrial, and transportation, as well as primary fuels consumed for electricity generation.

The physical size of a state, as well as the available fuels, types of businesses, climate, and population size and density, all play a role in determining the level of total and per capita emissions. In addition, each state's energy system reflects circumstances specific to that state. For example, some states have abundant hydroelectric supplies, and others contain abundant coal resources.

The term *energy-related CO2 emissions*, as used in these tables, refers to emissions released at the location where fossil fuels are consumed. If fuels are used in one state to generate electricity consumed in another state, emissions are attributed to the state in which the electricity is generated and the fuels are combusted. Attributing emissions to the state consuming the electricity, rather than the state where it is generated, would yield different results. For feedstock uses of fossil fuels, carbon stored in products such as plastics is allocated to the states where the petrochemicals are produced.

The calculations presented in these tables also assume that biomass used by electricity generators, by industries, and by homes and commercial buildings is carbon neutral and that combustion emissions are fully offset by land sinks in a sustainable biomass cycle. Emissions may be underestimated to the extent that actual use of biomass energy may not be carbon neutral.

The accompanying tables highlight the following key concepts

Total state emission levels

Because of differences in how EIA calculates national and state data sets, the combined total of energy-related CO2 emissions shown for all states is not the same as the total for the United States. The difference between these two totals is shown as an adjustment factor in Table 1. This factor is distributed to the states in proportion to each state's share of the total in Table 2. Only the state-level total CO2 values are adjusted in these tables.

Emissions by fuel

States exhibit very different emissions profiles based on the energy fuel mix used by generators in the state (Table 3). For example, some states use coal for most of their electricity generation, and other states have abundant non-carbon emitting hydropower resources or are transitioning their electric power systems to natural gas and renewables.

Emissions by sector

CO2 emissions also vary across states significantly by sector (Table 4), based on factors such as different climates, different sources of economic outputs (e.g., commercial versus industrial activity), and the use of different fuels for electricity generation.

Per capita carbon dioxide emissions

Total CO2 emissions across states can be divided by state population to examine them on a per capita basis (Table 5). In addition to population density, the factors that also affect a state's total levels of CO2 emissions include climate, the structure of the state economy, energy sources, building standards, and explicit state policies to reduce emissions. These factors also contribute to variation in the amount of emissions per capita.

Energy intensity

The energy intensity of a state, as measured by the amount of energy consumed per unit of economic output or, specifically, British thermal units (Btu) per dollar of a state's gross domestic product (GDP), plays an important role in its overall emissions profile (Table 6). The states with relatively high energy intensities tend to be in cold climates, are mostly rural, or have a large industrial base relative to their overall economy. The states with the highest rates of energy-related CO2 emissions per capita also tend to have higher energy-intensity values. Many of the states with the lowest energy intensities are clustered in the relatively densely populated New England and Middle Atlantic regions.

Carbon intensity of the energy supply

The carbon intensity of energy supply (CO2/Btu) reflects the energy fuel mix within a state (Table 7). As with energy intensity, the states with a more carbon-intensive energy supply tend to be the states with high per capita emissions. In all of these states, coal was the dominant emissions source (Table 3). The states with less carbon-intensive energy supply tend to be those states with relatively substantial non-carbon electricity generation from sources such as nuclear or hydropower.

Carbon intensity of the economy

The overall carbon intensity of the economy (CO2/dollar of state GDP) combines energy intensity with the carbon intensity of that state's energy consumption. As expected, the states with the greatest carbon intensity of their economies (Table 8) as measured in metric ton (mt) of CO2 per million dollars of state GDP (mt CO2/million chained 2009 dollars of GDP) are also the states with the highest values of energy intensity and carbon intensity of that energy supply. The states with the lowest carbon intensity of economic activity are also states that appear on the lower end of both energy intensity and the carbon intensity of that energy supply.

Electricity trade

These data tables assign all emissions related to the primary energy consumed for the production of electricity to the state where that electricity was produced rather than where it was consumed. As a result, the states that produce electricity from fossil fuels (especially coal) and sell that electricity across state lines tend to have higher per capita CO2 emissions than states that consume more electricity than they produce. If the emissions associated with the generation of electricity were allocated to the states where that electricity was consumed, the emissions profiles of both the producing and consuming states would be different in many cases. In an index of net electricity trade, a value greater than 1.0 indicates a net interstate exporter of electricity, a value less than 1.0 indicates a net interstate importer of electricity, and a value equal to 1 indicates a state generates as much electricity as it consumes (Table 9).

Other state-related links

The underlying energy data used to calculate the state-level CO2 values can be found in the State Energy Data System (SEDS). SEDS is the main repository for all of EIA's state-based energy data.

EIA's State Energy Profiles contain narratives and rankings for each state as well as electricity data and analysis.

EIA also has two fuel-specific profiles: the State Renewable Energy Profiles and the state nuclear profiles.

EIA's interactive energy map shows the major energy facilities and infrastructure in the United States.

EIA also collects data on state emissions for the electric power industry for sulfur dioxide and nitrogen oxides as well as CO2. The electric power industry includes electricity generated in the electric power, industrial, and commercial sectors. The downloadable spreadsheet includes U. S. electric power industry estimated emissions by state from 1990 (Form EIA-860 and Form EIA-923).

The State Energy Portal offers multiple ways to examine energy and energy-related CO2 emissions data.